

Abstract

Microsphere sensors (i) having receptors selectively substantially provided at only an equator region, (ii) formed of a relative high IR material, and/or (iii) having a relatively small radius are provided with improved sensitivity. Such a microsphere sensor may be made by selectively treating an equator region of the microsphere forming a small concentrated receptor band on the high sensitivity portion of the microsphere surface. Changing the selected laser frequency applied to the microsphere sensor to a shorter wavelength also improves sensitivity. Physical properties of the microsphere sensor system: index of refraction, laser frequency, and microsphere radius may be adjusted in concert to match the target entity molecule size. These improvements in sensitivity may allow detection and/or identification of unknown target entities based on detectable step shifts observable in light modes due to the adsorption of even a single molecule as small as about 200,000 Da.